The *Bulletin* is sent out to all botanic and agricultural departments in correspondence with Kew, and much of its contents is usually reprinted in local journals. It affords the best evidence of the many activities of the Royal Gardens, in advising upon the possible development of the natural resources of our Colonies and Dependencies. Almost every issue contains a number of plain statements of attempts made to introduce new and commercially profitable plants in suitable districts, of improved methods of cultivation, and of work that men trained at Kew are doing in the various parts of the world to which they have gone from the Royal Gardens. By suspending the publication of the *Bulletin,* the link connecting Kew with the whole of the botanic stations of the Empire is broken, and the means of communicating information to them all is removed at a time when the information afforded is no less valuable than in pre-war periods.

Without knowledge of the functions fulfilled by the *Bulletin*, and an intimate acquaintance with what it has accomplished in providing information not accessible in any other form in regard to the capabilities of the various parts of the Empire for the cultivation of plants of economic importance, no Government official is capable of deciding justly whether the *Bulletin* is an essential publication or not. The British Science Guild urges, therefore, in the interests of Imperial development, that the decision be submitted to a competent tribunal, which will take into consideration, not only the shortage of paper, but also the value of what is printed upon it. It is confident that the result of such an inquiry would be a judgment in favour of the continued publication of the *Bulletin.*

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PROF. KR. BIRKELAND.

We regret to learn from the *Morning Post* that Prof. Kr. Birkeland, of Christiania, died in Tokyo on June 18. He was one of the few speculative physicists of the day the value of whose work would be generally admitted in commercial circles. He was the co-inventor with Mr. Sam Eyde of the Birkeland-Eyde direct process for the manufacture of calcium nitrate by the extraction of nitrogen from the atmosphere. In the Journal of the Royal Society of Arts, May, 1912, Mr. E. Kilburn Scott records how, starting with a 25-h.p. experimental plant in 1903, the company controlling the Birkeland-Eyde patents had 200,000 h.p. at work in 1912, and was likely to add a further 300,000 h.p. before the end of 1916. This was by no means the only successful patent in which Prof. Birkeland was interested.

As a theorist Prof. Birkeland was extraordinarily bold in his speculations. He had theories on the internal constitution of the sun and the nature of sunspots, on the sun as a magnet and as a source of electricity, on the origin of the planets and their satellites, on the nature of various celestial phenomena, especially the zodiacal light, on the production of aurora and magnetic storms, and on the past geological history of the earth. The wealth acquired by his practical gifts enabled Prof. Birkeland to experiment and arrange for solar and magnetic observations on a large scale. He made many striking experiments with an artificially magnetised terella in a high vacuum, directing towards it electrical discharges, intended to represent the discharge of corpuscles from the sun. In some of his experiments the vacuum chamber had a capacity of 70 litres, and the supply of electrical energy required a 6-h.p. engine. He obtained phenomena closely resembling various forms of aurora, which he believed to represent the conditions under which magnetic storms appear on the earth.

Prof. Birkeland was largely responsible for the institution of special magnetic observatories in Arctic regions in 1900, in 1902-3, and again during the last few years. His two large volumes in English, "The Norwegian Aurora Polaris Expedition, 1902-3," besides much speculation as to the causes of magnetic storms, contain much important information as to the simultaneous progress of magnetic disturbance at different parts of the earth. Since 1910 he had lived a good deal abroad for observational purposes, and numerous communications to the *Comptes rendus* of the French Academy of Sciences describe his various conclusions and speculations. In one dated July, 1914, he expressed his intention of devoting the next three years to the study of the zodiacal light in Natal, at Helwan, and in Uganda, and he was working in Egypt in 1915 and 1916. Presumably the continuation of his quest had taken him to the Far East. At the time of his death Prof. Birkeland was only about fifty years of age; but when last in England, in 1913, he had aged considerably in appearance and become very deaf. He was, however, as animated as ever when discussing his theories.

C. Chree.

NOTES.

On June 20 Lord Montagu of Beaulieu gave an interesting lecture before the Aeronautical Society of Great Britain on the world's air routes and their regulation. He pointed out how favourably placed the British Empire was in this matter, inasmuch as its many possessions were so scattered about the globe that suitable landing and halting places could be provided without the necessity of asking for concessions from other nations. Lord Montagu based his calculations upon an assumed speed of 120 miles an hour, and showed that with two five-hour periods per day the journey to India could be accomplished in four days. Under the stage which aeroplanes have now reached, the carriage of mails and passengers to India seems quite a feasible proposition; the meteorological conditions along the tracks that might be followed, except at the British end in the winter, are quite good. Crossing the Atlantic is another matter, especially from Europe to America; the shortest track, from Ireland to Newfoundland, is in the winter a region of gales, mostly from some westerly point, and if the more favourable weather that prevails further south is sought, the distance is about doubled. Lord Montagu's suggestion is that certain levels should be assigned to certain types of traffic, but it has been estimated that at any given time one-half of the earth is covered with clouds, and a pilot above a sheet of clouds cannot keep his course, as there is nothing to tell him the strength and direction of the air drift to which he is exposed. It follows therefore that a pilot aiming at a definite place must fly low enough to see the earth at frequent intervals; in or above a cloud sheet he would have no horizon and could not rely on astronomical observations for his position. Thus the traffic to which the highest levels were assigned would be at a great disadvantage.

THE Executive Committee of the Conjoint Board of Scientific Societies presented its report on the work of the last six months at the fourth meeting of the Board, held at the Royal Society on June 13, Sir Joseph J. Thomson in the chair. The report indicates that a number of important questions of scientific and industrial importance has occupied the attention of the Board. Various bodies are at present interested in the formation of a census of the mineral resources of the Empire. It was agreed to enter into communication with these bodies and to make suggestions with a view to the publication of information in a form useful to the general community. Interim reports were received and approved on the necessity for an anthropological survey of the British people, on the best methods for carrying on the International Catalogue of Scientific Literature, and on an inquiry into the desirability or otherwise of the adoption of the metric system throughout the British Isles. The sub-committee on National Instruction in Technical Optics reported that a scheme approved by the Board of Education had now come into operation (see NATURE of May 24 and June 14). A sub-committee, having considered special cases of magnetic disturbances revealed by a magnetic survey of the British Isles, and their possible connection with the occurrence of iron ores, recommended a detailed investigation of two test areas, in order to ascertain how far, under the conditions of the British iron ores, the magnetic survey was likely to prove of economic value. Arrangements for carrying out the investigation are in progress. An agricultural sub-committee, with the Earl of Portsmouth as chairman, reported that it is at present devoting itself mainly to engineering questions. It is engaged in collecting information with regard to the transport of raw materials to farms and agricultural products from them, to the power required for this purpose, and for seasonal operations on the land, with the view of comparing the relative advantages and costs of steam or internal-combustion engines and electrically operated machines. A sub-committee was appointed to report on what is at present being done to ascertain the amount and distribution of water power in the British Empire. A complete report of the first year's work of the Board will be published in due course.

WE notice with regret the announcement of the death on June 19 of Dr. Robert Bell, F.R.S., formerly chief geologist of the Geological Survey of Canada.

THE King has been pleased to award the Edward Medal of the First Class to the representatives of Mr. Andrea Angel and Mr. George Wenborne, who lost their lives in endeavouring to save the lives of others on the occasion of a fire which broke out at the Silvertown Chemical Works on January 19 last.

IN order to celebrate the centenary of the birth of Henry D. Thoreau, the Humanitarian League (53 Chancery Lane, W.C.2) has arranged a meeting to be held in the Caxton Hall, Westminster, on the evening of July 12. The chair will be taken at 8 p.m. by Sir John L. Otter, J.P., and short addresses will be given by various speakers. Admirers of Thoreau's writings are invited to be present.

IN a recent issue (June 14, p. 312) we directed attention to a report that the Prime Minister and others were awakened by the sound of the explosions at Messines on June 7. The evidence in favour of the sound having been heard in and near London is, however, insufficient, and information since received from Flanders throws doubt on the statement. An officer of the Royal Engineers, who was only a mile from the largest mine when it was fired, describes the noise as "not so very great"; while another, who was at a distance of eight miles, saw the flash, waited for the noise, and heard only a slight "phit." A contrary wind might, of course, have tilted the sound-waves over the latter observer, but the wind seems to have come from the direction of the front, for the air at the time on the west side was charged with lachrymatory gases. Moreover, a well-prepared explosion is seldom noisy.

THE governors of the West of Scotland Agricultural College have recently issued, in the form of a bulletin (No. 81), a summary by Principal W. G. R. Paterson of certain schemes for the training and employment, particularly in rural occupations, of discharged disabled sailors and soldiers. The three schemes dealt with were selected from eight submitted in response to an offer of prizes placed at the disposal of the governors through the generosity of an anonymous donor. Each scheme is outlined and critically discussed by Mr. Paterson, who contributes also a comprehensive memorandum drafted independently for the consideration of the governors of the college. It is not possible within the compass of a short note to indicate adequately even the essential features of the different schemes, and it must suffice to commend their suggestiveness as to the useful part that may be played in the solution of the problem by the regeneration of our villages, the establishing of colonies of smallholders, the setting up of isolated holdings, and the revival of a number of subsidiary rural industries, as well as the development of new industries.

La Nature (No. 2279, June 2, 1917) devotes a special article to the question of the method of choosing an employé. It is a plea for a more scientific treatment of the problem of adjusting the work to the worker, so that the right person is put to the work for which he is naturally adapted, and also that the work itself should be analysed, with the object of discovering what particular qualities, both mental and physical, it will demand, and, having discovered these, to train the worker along those lines. The writer quotes with approval the attempts made in America in the direction of scientific management of labour. He describes various tests, such as tests of manual dexterity, of comprehension, of judgment, etc., which he suggests might be advantageously used by employers of labour when selecting workmen. It is, however, necessary to issue a warning to those enthusiasts who are tempted to accept "tests" uncritically, viz. that one is not entitled to assume that, because a person does well in any given test, he will necessarily be willing to do well in work demanding that same quality for an employer. That he *can* do it is not equivalent to that he *will* do it. Again, it is necessary to be on one's guard against believing in some one test as a test of a particular capacity. It is possible to have, *e.g.*, an excellent memory in a given line of interest, and a very weak one in some other direction. The article is interesting and timely, but much yet remains to be done by trained scientific workers before the method of tests can be generally applied.

We have received a copy of a pamphlet published by the justice to the Mountain Committee in Tacoma, Washington, and containing the appeal submitted to the United States Geographic Board urging that the mountain now officially known as Mount Rainier should in future be called Mount Tacoma. The request is supported by the House of Representatives of the State of Washington, the Federation of North-West American Indians, and public opinion generally in Seattle and Tacoma. The mountain, which lies about fifty miles east of Puget Sound, in the Cascade range, was discovered in 1792 by Vancouver, and named by him after Rear-Admiral Rainier, R.N. Rainier had certainly no connection with that coast, but the arguments adduced against the use of his name for the mountain do not seem to us to be very convincing. On the other hand, a great deal is to be said for the use of the name Tacoma, which is the modern version of the old Indian name, and the one by which the mountain is generally known in the district. And, after all, the local residents must be the arbiters in the matter, and no decision of the United States Geographic Board can alter local usage. The committee has gone to a great deal of trouble in collecting evidence as to written and oral usage, and has made out a good case for the use of Tacoma in preference to Rainier.

We have received the report of the bacteriologist (Mr. Ward Giltner) of the Agricultural Experiment Station, East Lansing, Mich., U.S.A., for the year ending June 30, 1916. Much research has been carried out on contagious abortion of the cow. Attempts have been made to render animals insusceptible to infection with this disease, which is caused by *Bacillus abortus*, by vaccination with living and dead cultures, but with little success. Details are also given of the routine work carried out at the station.

The number of cases of paralysis following gunshot injury of nerves in the present war has given prominence to the subject of electrical testing of nerve and muscle, and the value to be attached to results of such testing for diagnosis and prognosis. The methods of testing commonly applied are by means of condenser discharges or by the faradic or the galvanic current, but it is doubtful if the reactions of the *muscles* induced thereby give information of the state of the nerve supplying them when once reaction of degeneration has developed. In a paper in the *Archives of Radiology and Electrotherapy* for May (No. 202) Dr. Adrian has applied to the human subject a method that was employed by Keith Lucas at Cambridge. A galvanic current of known and variable strength and duration is used. Dr. Adrian makes use of a time-constant known as the *chronaxie*. It is remarkably constant for muscle with undamaged nerve, and has a short duration; for denervated muscle it is very much longer. The method promises to be a useful one.

The *Geographical Journal* for May (vol. xlix., No. 5) includes a singularly interesting paper by Mrs. Scoresby Routledge describing the results of the expedition to Easter Island under the leadership of her husband and herself. We probably now possess all the information which local investigation can secure about the strange buildings and statues which have so long been a problem for anthropologists. The reading of this suggestive paper at a recent meeting of the Royal Geographical Society was followed by a discussion in which Sir Hercules Read, Sir H. Howorth, and Messrs. T. A. Joyce, A. P. Maudslay, Basil Thomson, and Henry Balfour took part. A most interesting suggestion was made by Mr. Joyce that on the basis of skull measurements the earlier Easter Island natives displayed Melanesian affinities. Mr. Balfour added that for affinities with their culture we must look rather to the West than to the East, the New World influence being practically ruled out. In his opinion the statues appear to show a relation to Melanesian art. This is the latest phase of this long-protracted controversy, and though the results are still to some extent uncertain, the problem has now decidedly advanced towards a definite solution.

The Proceedings of the Yorkshire Geological Society, new series, vol. xix., part iii., March, 1917 (Hull: A. Brown and Sons, Ltd.; price 7*s.* 6*d.* net) is devoted to a paper by Mr. T. Sheppard, entitled "William Smith: His Maps and Memoirs." No serious student of geology can fail to be interested in the life of William Smith, whose stupendous labours laid a sure foundation for the science of stratigraphy. Several memoirs of his life and work are in existence, and Mr. Sheppard has now said what may be presumed will be the last word on this subject. The paper is naturally concerned with Smith's work in Yorkshire as lecturer and geological explorer, but much space is given to full details of the publication of his maps, sections, and memoirs, and this information will be of great value to librarians and others. Reference is also made to the efforts of earlier writers to understand and explain geological features, and in this connection the ideas of George Owen, Martin Lister, John Strachey, John Woodward, Nicolas Desmarest, Christopher Packe, John Michel, John Whitehurst, John Smeaton, Prof. Jamieson, and James Parkinson have been briefly summarised. The paper is illustrated by numerous plates and figures in the text, and concludes with a bibliography.

Messrs. Ricard and Barral have recently communicated to the Société Médico-Chirurgicale Militaire de la XIV^{e} Région a very simple method of ascertaining rapidly and easily whether water has been poisoned. It consists in placing a few fish—blay, gudgeon, etc.—in a jar filled with the water to be tested. Two drops of nicotine per litre kill the fish in less than a minute; two drops of conicine paralyse them in six minutes and kill them in eight; one decigram of solanine kills in one and a half hours, the same quantity of cocaine in one hour, and the same quantity of stovaine in ten minutes. One milligram of aconite kills in three and a half hours; twenty drops of aniline in one and three-quarter hours; seven milligrams of digitalin only take effect in four hours. Veratrine does not appear to have any effect; one decigram of potassium cyanide kills the fish in two minutes; two decigrams of corrosive sublimate in ten to twelve minutes; two grams of lead acetate in five hours; five grams of zinc sulphate in two hours; two grams of copper sulphate in forty-five minutes; and thirty-five centigrams of picric acid in five hours. On the other hand, the fish do not appear to be inconvenienced by morphine, cantharidine, atropine, pilocarpine, hyoscyamine, scopolamine, or arsenical salts. Water in which fish die in less than four hours should therefore be considered as dangerous.

THE Journal of the East Africa and Uganda Natural History Society (vol. vi., No. 11) contains a number of extremely interesting papers. Not the least of these is that by Mr. R. L. Harger on the desiccation of Africa. Reviewing the records on this theme of pioneers like Livingstone, Harris, and Selous, the author adds much valuable matter of his own, covering a vast extent of country from Tanganyika southward and westward. That the diminution of the chain of the great lakes and the river systems feeding them is proceeding at a most disconcerting rate there can be no question, but the author makes no suggestion as to the causes to which this shrinkage is due. Natural history notes from British East Africa, by Mr. A. Loveridge, afford one a vivid insight into the wealth and variety of the fauna of this part of Africa, for the habits and haunts of many of the smaller creatures unnoticed by the big-game hunter are vivaciously described.

OWING to the war the completion of the reports on the collections of zoological and botanical specimens obtained by the ill-fated British Antarctic (*Terra Nova*) Expedition, 1910, has been seriously delayed. Some of them we have already noticed in these columns. The trustees of the British Museum have now issued Dr. W. T. Calman's report on the Crustacea, and two reports on the marine and fresh-water Algæ, and these sustain the high standard of their predecessors. Four very diverse groups of Crustacea are represented in this collection, and of these two only, belonging respectively to the Cumacea and the Phyllocardia, were taken in Antarctic waters. Two species of Cumacea new to science were taken off the extreme north of New Zealand, and one new species of Stomatopod was taken off the Brazilian coast. Of these Dr. Calman gives admirable descriptions and some very beautiful figures. The marine Algæ have been worked out by Mr. and Mrs. Antony Gepp, and the Melobesieæ by Mme. Paul Lemoine. Only two species of marine Algæ were taken in Antarctic waters, and these are not new. The only specimens of Melobesieæ collected proved, on examination, to represent two species new to science; one of these was taken off New Zealand, the other off Trinidad. Very beautiful figures of both are given. All the fresh-water Algæ collected were Antarctic. They were entrusted to Prof. F. E. Fritsch for investigation, and proved to contain two new species. From the material collected Prof. Fritsch has been enabled to describe the cell-division of *Pleurococcus antarcticus*, which was hitherto unknown.

THE annual report for 1916 of the Horticulture Branch of the Board of Agriculture and Fisheries contains, amongst other matters of interest, a summary of the work accomplished in connection with the investigation and control of various plant diseases and insect pests. Of the notifiable diseases a distinct improvement is recorded in the case of American gooseberry mildew, but a much less satisfactory position with regard to wart disease of potatoes. The latter disease has not only spread throughout areas known previously to be infected, but has also made a sporadic appearance in several new places. Glamorgan, South Lancashire, and Durham are mentioned as areas in which the disease is very prevalent. It is gratifying to note, however, that in areas previously notified as infected very satisfactory results have been obtained by the action of the Board in securing the use of resistant varieties. It is reported that the long and elaborate inquiry into the parasitism of the large larch sawfly has been concluded, but the results have not yet been tabulated. With reference to plant diseases not caused by scheduled pests, special mention is made of the "capsid bug" disease of apples and apple mildew, both of which have been the subject of investigation by the officers of the branch. An interesting summary is also given of the present position with regard to Isle of Wight bee disease, the supervision of which is included among the duties of the branch. The report this year is not issued separately, but appears in the form of an article in the *Journal of the Board of Agriculture* for May.

MEMOIR 92 of the Canadian Geological Survey, by Mr. J. A Dresser, indicates the excellent prospects of water-power in the Lake St. John district, north of the city of Quebec, and includes an opportune review, by Prof. A. Stansfield, of the smelting of iron-ores rich in titanium. This article, with its references to recent work, will be of service in mineral development elsewhere, and possibly in Ireland.

THE Bulletin of the Hawaiian Volcano Observatory for January, 1917, is of more than usual interest from its record of experiments with Seeger cones enclosed in iron pipes some 40 ft. long, which were thrust into grottoes of glowing lava. It is shown that in a distance of 20 ft. the temperature may vary from 850° C. to 1150° C., and there is some indication that the incandescent upper layers of the lava, emitting gases, may be of higher temperature than the more viscous mass below.

MR. J. C. H. MINGAYE describes several meteorites in the Records of the Geological Survey of New South Wales, vol. ix., part iii., 1916. The Government printer may be congratulated on the beautiful coloured plate showing the various types of olivine in the pallasite of Molong. Mr. Mingaye's detailed analyses of two australites (obsidianites) in the same part serve to emphasise the difference between these bodies and ordinary meteorites.

PROF. C. SCHUCHERT, in discussing the correlation of strata on the basis of palæogeography (Bull. Geol. Soc. America, vol. xxvii., p. 491, 1916), provides an interesting series of maps showing the prevalent conditions in the west of North America during successive Mesozoic periods, and a still more valuable conception of the relations of land and water in early Permian time, in the form of a map of the world, on which the areas are marked where evidences of Permo-Carboniferous glaciation have been found. Teachers of geology may like to enlarge this map into a diagram. The author supports the theory of the permanence of oceanic and continental areas, which seems to many geologists to be based partly on our ignorance of what underlies the oceans, and partly on the definition of oceanic water.

IN the Transactions of the Royal Society of South Africa (vol. vi., part i.) Mr. S. H. Haughton, assistant director, South African Museum, describes ancient human remains found during the excavation of a drain at Kolonies Plaats, Boskop, in the Potchefstroom district of the Transvaal, in 1913. The remains found consist of a large portion of a calvaria, the horizontal part of the left ramus of the mandible, the major portion of a temporal bone, and some fragmentary limb-bones. The distinctive feature of the skull is that at the level of the posterior part of the parietal there is a decided flattening, which continues on to the superior part of the occipital bone. The occipital projects strongly, and has a thick ridge bifurcating downwards The flattening of the skull is not paralleled by any skull in the South African Museum, although, according to Mr. Boule, it has been seen on some negro skulls and also upon a Namaqua skull now in the Paris Museum. The paper gives a full account, with photographs, of this interesting specimen. Prof. G. Elliot Smith thus sums up the question: "Whatever the date of the Boskop remains may be, the evidence now in our possession suggests that this early inhabitant of the Transvaal represents the type of the immediate ancestors of the men of the Upper Palæolithic (or, as I prefer to call it, the Neanthropic) age, possibly somewhat modified in the course of his southern migration. It probably represents the earliest (not necessarily in actual age) known phase of *Homo sapiens* in the course of his transformation from a condition analogous to that of Neanderthal man to that of Cro-Magnon."

Two very important palæontological papers by Mr. R. Bullen Newton have recently been published. The first, "On the Conchological Features of the Lenham Sandstones of Kent and their Stratigraphical Importance," forms the subject of his presidential address to the Conchological Society of Great Britain and Ireland (Journ. Conch. Soc., vol. xv., pp. 56–149, four plates). The work on these puzzling deposits begun by Prestwich, Wood, Lyell, and other noted geologists, was well advanced by the late Mr. Clement Reid (NATURE, vol. xxxiv., 1886, pp. 341–43, and in his "Pliocene Deposits of Britain," Mem. Geol. Surv., 1890), who regarded the beds as of Coralline Crag age, and equivalent to the Diestian of Belgium. Mr. Newton has now very carefully gone over Mr. Reid's material in the Museum of Practical Geology with the Graham Wallas and other collections in the British Museum (Natural History), and here discusses most fully each fossil species and its occurrence in time and space, illustrating photographically all the more important forms. The conclusions he comes to will certainly surprise our older geologists, for he terminates the Pliocene with the Red Crag, and refers to the Upper Miocene, in descending order, (*a*) the Coralline Crag; (*b*) the Diestian of Belgium; (*c*) St. Erth beds; (*d*) Lenham Sandstones; (*e*) Anversian of Belgium; and (*f*) the Upper Miocene of Germany; whilst he refers the "Box Stones" to the Middle Miocene. These important and seemingly well-based conclusions deserve a wider notoriety than the pages in which they appear are likely to obtain for them. The second paper describes an interesting mass of "Fossiliferous Limestone from the North Sea" (Quart. Journ. Geol. Soc., vol. lxxii., 1917, pp. 7–22, one plate). After a painstaking investigation of its fossil contents, Mr. Newton decides that it represents a submarine exposure of beds belonging to the lower portion of the Coralline Crag. The accompanying plate is worthy of attention, since the process adopted is the best yet employed in this country for depicting shells.

Science for May 18 contains an address by Prof. R. D. Carmichael on the provision made by mathematics for the needs of science. While very properly defending the study of mathematics for its own sake, he points out that many of its most interesting problems have been suggested by natural phenomena, while, conversely, this debt has been amply repaid by the application of mathematics to astronomy, physics, and chemistry, not to mention other sciences. Prof. Carmichael is one of a group who are now working at a new development of the theory of difference equations, and he expresses a hope that this may have some direct application to theoretical physics. As he says, our latest physical hypotheses seem to be tending towards an atomic, discrete, or statistical form, so that differential equations are not always the most appropriate tools to be employed. Not impossibly we may have a Boscovitchian interlude, after which a deeper insight may bring us back to a flux-theory again. In any case, it is satisfactory to find that mathematics is still growing with remarkable vigour, and providing new methods of attacking a new set of problems.

A RECENT technological publication (No. 82) of the Bureau of Standards, Washington, describes an experimental investigation recently made of the causes of failure of a number of articles, particularly bolts, of wrought brass of the type 60 copper, 40 zinc, with special reference to the presence of initial stress. The work was taken up in connection with tests, made for the New York Board of Water Supply, of failed brass bolts which had been in service in the construction of the new Catskill Aqueduct, which is to supply water to the city from the watersheds of the Catskill Mountains. In view of the fact that most of the equipment and materials used in this construction would be subjected to the corroding action of both water and the atmosphere, a substitute was sought for steel, which would ordinarily be used, and it was considered possible to find a brass which would have mechanical properties comparable with those of steel and yet be practically incorrodible. As such a substitute the so-called manganese bronze was chosen. In the course of the investigation the physical properties, micro-structure, and initial stress distribution have been studied in failed and sound materials, not only from the Catskill Aqueduct construction, but also from the filtration plant of the city of Minneapolis, the Navy Department, and the Panama Canal, and in new material from a number of manufacturers. Failure has occurred (1) as a result of faulty practice in forging bolt-heads, flanging plates, etc.; (2) as a result of the presence of initial stress; and (3) as a result of service overstress due to drawing up bolts too tightly. This investigation shows that an average initial stress of 5000 lb./sq. in. (350 kg./cm.^{2}) is to be regarded as a safe limit for rods and bolts of this type of material under ordinary service conditions, in which the service load itself is not greater than from 5000 to 10,000 lb./sq. in. Experiments have also been made to ascertain under what conditions of annealing initial stresses could best be removed, and have shown that temperatures of from 300° to 400° C. are sufficient to reduce in from one to seven hours the initial stresses to a safe value.

MESSRS. ROSS, LTD., have purchased from the Controller appointed by the Board of Trade the Zeiss Optical Works at Mill Hill, including all machinery and tools therein; also their business premises at 13 and 14 Great Castle Street, W.1., including the stock-in-trade, etc.

OUR ASTRONOMICAL COLUMN.

ORBIT OF COMET 1915*a* (MELLISH).—The orbit of this comet, which was discovered by Mellish on February 10, 1915, and afterwards became a naked-eye object, has been investigated by L. Rosenbaum (*Ast. Iaktt. Stockholms Obs.*, vol. x., No. 5). The comet traversed a heliocentric arc of 205° during the eleven months of its visibility. After taking account of per-